REMARKS

The Office Action dated March 4, 2011 has been reviewed and carefully considered. Claims 4, 5, 7, 10-12 and 19-21 have been cancelled. Claims 22-24 have been added. Accordingly, claims 1, 2-3, 6, 8, 9, 13-18 and 22-24 are now pending, the independent claims being claims 1 and 22. Reconsideration of the above-identified application, as amended and in view of the following remarks, is respectfully requested.

Claims 1, 4 and 8-10 stand rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. Applicants have amended claim 1 (and drafted new claims 22-24) to address the issues raised by the Examiner. Applicants submit that the requirements of 35 U.S.C. 112, first paragraph have been fully met and request that this rejection be withdrawn.

"Claims 1-6, 11-15, 1-19" stand rejected under 35 USC 103(a) as being unpatentable over Dakin et al., U.S. 2003/0102808 (Hereinafter, "Dakin"). Claims 1, 5, 6, 16 and 20 stand "rejected under 35 USC 102(b) as being anticipated by Jackson U.S. 2002/0185973 (Hereinafter, "Jackson"). Applicants wish to point out two minor errors in the above quoted language of the Office Action: (1) there is no specific rejection of claim 16; and (2) the actual rejection citing Jackson is a 103 rejection.

Applicants respectfully disagree with, and explicitly traverse, the examiner's reason for rejecting the claims.

Claim 1, as amended and with emphasis added, recites:

A lamp comprising:

a discharge vessel **having a volume that lies between 0.008 and 0.009 cm^3**;

an outer envelope surrounding the discharge vessel and having a ceramic wall which encloses a discharge space filled with a filling comprising an inert gas, and an ionizable salt; and

two electrodes arranged in the discharge space having tips with a mutual interspacing so as to define a discharge path between the tips;

said ionizable salt consisting of NaI, TlI, CaI_2 and XI_3, wherein X is selected from the group consisting of rare earth metals and wherein the amount of NaI, TlI, CaI_2 and XI_3 lies between 0.025 and 0.3 g/cm^3.

As so amended, the volume of the discharge vessel is now recited (bolded above), the previous molar percentage feature has been deleted, and the feature of previous claim 5 (underlined above) has been added. Support for the bolded feature is found in the specification, *inter alia*, in paragraph [0008]. The recited size of the discharge vessel limits the lamp to applications such as a vehicle headlamp in which a relatively small wattage (e.g., 30W) is employed. Further, in such applications efficacy of the light produced is more critical. In this regard the present invention addresses a problem in the prior art that is discussed at paragraph [0004]:

> Disadvantages of the known metal halide lamp are the following. A central part of the discharge vessel thereof has on both sides narrow end parts or extended plugs (i.e. elongated end parts) connected to the central part of the discharge vessel, which enclose the current conductors. However, as said plugs are remote from the discharge path, they function as cooling fins, so that part of the lamp filling (i.e.

salts) may condense in a void between each current conductor and the (wall of the) extended plugs. Said condensation may lead to color instability of the metal halide lamp, which is disadvantageous particular when applied as projection lamp. De-mixing of salt components generally is disadvantageous as it leads to color instabilities (for example, if the filling contains NaCe-iodide, more Na than Ce will creep into said voids). In order to obtain a light efficacy as high as possible, preferably rare earth metal iodides as CeI_3, PrI_3, LuI_3 and/or NdI_3 are added to the filling. **However, these salts especially if larger mole fractions are applied are aggressive and will easily result in attack of the ceramic wall of the discharge vessel. What is more, said wall attack--close to the discharge path--will lead to scattering/absorbing of light with all disadvantageous consequences for the light distribution** [emphasis added]. Finally, the light output as function of time should be as stable as possible. However, if salt reacts with other lamp parts and thus disappears, for example, said light output (and thus maintenance) will drop.

The Office Action relies on Dakin and Jackson as rendering claim 1 obvious. Each of these references relates to a larger, higher wattage discharge application in which color properties are stressed (e.g., Dakin, paragraphs [0005] and [0015]; Jackson, [0004] and [0051].

With respect to Dakin, the Office Action acknowledges that Dakin does not specifically disclose that the amount of NaI, TlI, CaI2 and XI3 lies between 0.023 and 0.3 g/cm3" (Office Action, Page 6, next to last paragraph). Pointing to paragraph 29 of Dakin, the Examiner argues that "50 mg of salt with a lamp volume between .167 and 2 cc" would read on the claim language. As an initial matter, Applicants submit that claim 1 has been amended to recite a size of between 0.008 and 0.009 cm^3. Dakin's invention is thus so far outside of the claimed range as to not make its teachings obvious.

Moreover, paragraph 29 on which the Office Action relies relates to a specific arctube body (having apparently exterior dimensions of 33.7 mm long and 15.6 mm in diameter or 6.4 cm^3; and described as having a (interior) volume of "4.1 cc"). 50 mg of salts distributed in this volume would yield approximately 0.012g/cm^3 – far less than the minimum of 0.025 cited in claim 1. Further, claim 1 recites that the quantity of NaI, TlI, CaI_2 and XI_3 lies between 0.025 and 0.3 g/cm^3. The 0.012g/cm^3 number calculated from the information provided in paragraph 29 of Dakin includes metal halides other than the claimed four items thus making the Dakin's concentration of these four items even less than the calculated .012g/cm^3. For these reasons, Applicants submit that claim 1 is not obvious over Dakin – especially when a modification is required of more than doubling the concentration taught by Dakin.

One could argue that the concentrations used in Dakin are mere design choices and that it would be obvious to modify them to meet the features of claim 1. Applicants submit that such changes are not in fact obvious as they relate to tradeoffs that occur in the design. As Dakin himself notes at paragraph [0008]:

> One mechanism for dealing with the problem associated with developing high wattage ceramic metal halide lamps is the selection of the appropriate arc discharge fill. Because of the effect on all characteristics of the lamp, including, lumen output, color temperature, efficiency, interaction with the arc discharge chamber, and starting capabilities, only to name a few, **fill selection is a very complicated undertaking.**

The Office Action also rejected claim 5 as being obvious over Jackson in light of his paragraph 72. Relying on paragraph 40, the Office Action argues that the inner

dimension of the lamp are 7.4 mm in diameter and 26 mm in length. Assuming a cylindrical shape, this yields an internal volume of 1.1 cc. As an initial matter and as noted above with respect to Dakin, this far exceeds the .009 cc size of the discharge vessel recited in claim 1. The Office Action further argues that as paragraph 72 of Jackson teaches 10-50 mg of salt, the corresponding ratio fits within the range cited in claim 1. However, the Examiner is mixing apples with oranges as paragraph 40 on which he relies **requires** that there be 15 mg of salts. Accordingly, the ratio 15/1.1 yields a concentration of $0.014 g/cm^3$. As with Dakin, Applicants submit that claim 1 is not obvious over Jackson when a modification is required of doubling the concentration taught by Jackson.

A claimed invention is prima facie obvious when three basic criteria are met. First, there must be some suggestion or motivation, either in the reference themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the teachings therein. Second, there must be a reasonable expectation of success. And, third, the prior art reference or combined references must teach or suggest all the claim limitations.

As shown above, not all of the features of the independent claim 1 are taught either by the Dakin or the Jackson reference. Accordingly, Applicants submit that the reason for the examiner's rejection of the claim has been overcome and can no longer be sustained. Applicants respectfully request reconsideration, withdrawal of the rejection and allowance of claim 1.

With regard to newly added independent claim 22, Applicants wish to address the Office Action's rejection of the "molar percentage ratio feature" contained in the previous language of claim 1. With emphasis added, claim 22 recites:

22. A lamp comprising:

a discharge vessel;

an outer envelope surrounding the discharge vessel and having a ceramic wall which encloses a discharge space filled with a filling comprising an inert gas, and an ionizable salt; and

two electrodes arranged in the discharge space having tips with a mutual interspacing so as to define a discharge path between the tips;

said ionizable salt consisting of NaI, TlI, CaI_2 and CeI_3, and a molar percentage ratio $CaI_2/(NaI + TlI + CaI_2 + CeI_3)$ lies between 50 and 90%.

With respect to the rejection using the Dakin reference and the data found in the table in paragraph 24 of Dakin, the Office Action computes a ratio of 45%. This computation is done with essentially the optimum parameters to attain this high a ratio. That is, the minimum value is selected for NaI and the maximum value is selected for CaI_2. The Office Action then acknowledges that "Dakin does not explicitly disclose greater than 45% for the molar percentage ratio," but it would be obvious to do so in light of Dakin.

Applicants respectfully disagree. However, in the interests of furthering prosecution, claim 22 now recites a molar percentage ratio $CaI_2/(NaI + TlI + CaI_2 + CeI_3) > 50\%$. Using the table in paragraph 24 of Dakin, Applicants submit that there is no combination of data that will yield this inequality.

Letting Z = $NaI + TlI + CeI_3$

The inequality $CaI_2/(NaI + TlI + CaI_2 + CeI_3) > 50$ can be rewritten as $CaI_2/(CaI_2 + Z) > 50$. It then follows that:

$(CaI_2 + Z) / CaI_2 < 100/50$

$1 + Z / CaI_2 < 2$

thus, $Z < CaI_2$; or substituting for Z,

$NaI + TlI + CeI_3 < CaI_2$

As the NaI value has a minimum possible value of 45%, and the CaI_2 value has a maximum possible value of 45%, Applicants submit that there are no values for TlI and CeI_3 that will satisfy this inequality. That is, Dakin not only fails to teach the element $CaI_2/(NaI + TlI + CaI_2 + CeI_3) > 50$ of claim 22, but in fact, teaches away from it.

With respect to the rejection using the Jackson reference and the data found in paragraph 72 of Jackson, the Office Action computes a ratio of 43%. As an initial matter, Applicants wish to point out that claim now specifically recites CeI_3 (rather than XI3). Jackson fails to teach or suggest this particular feature anywhere in his patent application. Further, Jackson notes in his discussion of "design parameters" commencing at paragraph [0045] the following:

> [0051] (vi) the salt composition is adjusted, to the desired color temperatures, for the geometry and varying lamp voltages of the high power MasterColor.RTM. lamps. A general composition range of the salts is given as the function of color temperature and lamp voltage.

Accordingly, the composition of salts in Jackson is constrained by color temperature and lamp voltage considerations. Moreover, the Jackson reference continually recites the presence of specific salts (e.g., 12% DyI_3, 12% HoI_3, 12% TmI_3 in the cited paragraph 40; 11-18% by weight of these same salts in Table II). **CeI_3 is excluded**. Accordingly, Applicants submit that Jackson fails to teach or render as obvious the use of CeI_3 as recited in claim 22.

A claimed invention is prima facie obvious when three basic criteria are met. First, there must be some suggestion or motivation, either in the reference themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the teachings therein. Second, there must be a reasonable expectation of success. And, third, the prior art reference or combined references must teach or suggest all the claim limitations.

As shown above, not all of the features of the independent claim 22 are taught either by the Dakin or the Jackson reference. Accordingly, Applicants submit that the reason for the examiner's rejection of the claim has been overcome and can no longer be sustained. Applicants respectfully request reconsideration, withdrawal of the rejection and allowance of claim 22.

The other claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect

of the invention, however, the individual consideration or reconsideration, as the case may be, of the patentability of each on its own merits is respectfully requested.

In addition, Applicants deny any statement, position or averment of the Examiner that is not specifically addressed by the foregoing argument and response. Any rejections and/or points of argument not addressed would appear to be moot in view of the presented remarks. However, Applicants reserve the right to submit further arguments in support of the above stated position, should that become necessary. No arguments are waived and none of the Examiner's statements are conceded.

For all the foregoing reasons, it is respectfully submitted that all the present claims are patentable in view of the cited references. A Notice of Allowance is respectfully requested.

Respectfully submitted,

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